



## Early Warning for Campus Emergencies

*“This is a test of the THOR Broadcasting System. In the event of an actual weather emergency, safety instructions for Beaver Stadium and Bryce Jordan Center patrons would follow. I repeat, this is only a test.”*

Sounds like a standard test message, possibly broadcast as part of routine maintenance at the nation's largest stadium. Except that this test used the THOR-8L, a new long-range directed acoustic device developed at Penn State University. And it was heard, clearly and distinctly, in a restroom located three-quarters of a mile away.

THOR was developed by the university's Applied Research Laboratory, the host entity for the Weapons and Protective Systems Technologies Center of Excellence (CoE). The CoE is a program of the Office of Justice Programs' National Institute of Justice (NIJ) and part of NIJ's National Law Enforcement and Corrections Technology Center system. THOR is designed to improve on currently available commercial off-the-shelf acoustic hailing devices and allow enforcement of the U.S. Navy's 500-yard vessel protection zone. However, the CoE also has been quick to promote THOR's possible law enforcement and public safety uses.

“One of our focus areas is school safety,” says Andrew Barnard, a research assistant in Penn State's Structural Acoustics Department. “We're exploring developing technology for safer campuses, and in this case, the CoE is promoting the leveraging of an existing technology for school safety purposes.”

In fact, the enthusiasm of campus and other local law enforcement for potential campus safety applications for the device, particularly in the wake of the April 2007 Virginia Tech shootings, led to the successful test demonstration described above on July 25, 2007.

“We had performed a demonstration for the Navy, and some of the Penn State administrators who saw THOR in action became its biggest advocate,” says Dr. Timothy A. Brungart, senior research associate and associate professor

of acoustics at Penn State. “Penn State police were extremely interested in its capability to notify the campus in the event of an emergency, both at Beaver Stadium and campuswide.”

The system, designed for intelligibility over long distances, overcomes even loud levels of background noise, yet doesn't overpower listeners standing right next to the device. And the obvious major difference, compared with using warning sirens, is that listeners can receive instructions on what they should do.

“It can be used for emergency warning purposes [such as in the event of a shooting], for communications when there's been a natural disaster like a flood, an earthquake or a fire, or any other time you might need to notify or warn extensive numbers of people,” Brungart adds.

Penn State, for example, experienced its own campus shooting incident on Sept. 17, 1996, when one person was killed and another wounded. Also, chemical spills, fires and other accidents are all-too-common hazards on college campuses. With that in mind, the research team designed the 2007 exercise, in which volunteers positioned in 21 locations around Beaver Stadium confirmed THOR's voice command intelligibility. Also, the end of the test message included an e-mail address and asked individuals elsewhere on campus who heard the message to respond, generating the following:

- “I thought that you should know that in Thomas Building your testing could be heard in the restrooms.” (The Thomas Building is three-quarters of a mile away; the restroom window was open).
- “My sister-in-law heard the message in her car as she was passing from the hospital to the campus.”
- “The telephone repair guy told me this morning that he was inside the Jordan Center working and he heard it loudly. He said he knew it wasn't the speakers on the scoreboard at the stadium because this was much louder than [they are].”

“My observations of the test were that it was outstanding,” Clifford Lutz, assistant director of the campus police department, told the organizers. “The uniform quality of the voice at all distances was amazing. Even at the [Bryce Jordan Center] where there was an echo, the clarity was maintained. The test clearly shows the value THOR would be as an emergency alert system.”

The research team continues to incorporate refinements into THOR, and commercialization, at an undetermined cost, is still a couple of years away. Brungart believes it is possible that larger universities would purchase their own systems for use as a campus security tool.

“If it saves one life in the wake of a campus incident,” Brungart says, “how much is that worth in both humanitarian terms and in terms of potential litigation?”

Brungart also thinks that states may possibly purchase systems and keep them in a central location for emergency deployment after hurricanes, floods and other natural disasters.

**For more information, contact Dr. Timothy A. Brungart at (814) 863-3034, e-mail [tab7@psu.edu](mailto:tab7@psu.edu)/, or Andrew Barnard at (814) 863-0819, e-mail [arb279@psu.edu](mailto:arb279@psu.edu)/.**

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This article was reprinted from the Winter 2009 edition of *TechBeat*, the award-winning quarterly newsmagazine of the National Law Enforcement and Corrections Technology Center System, a program of the National Institute of Justice under Cooperative Agreement #2005-MU-CX-K077, awarded by the U.S. Department of Justice.

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